

A taxonomic study of the genus *Blattella* Caudell, 1903 from China with description of one new species (Blattaria: Blattellidae)

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Abstract: In the present paper, *Blattella* Caudell is reviewed and nine species of *Blattella* are taxonomically studied from China, including one new species, *B. singularis* sp. nov., which is described and illustrated. A key to species from China is provided.

Key words: Cockroach; *Blattella*; taxonomy; cosmopolitic species; new species; China

1 INTRODUCTION

The cockroach genus *Blattella* was established by Caudell in 1903. Roth (1985) revised the genus *Blattella*, organizing a key through not only descriptions, but also distribution. The most outstanding contribution to the taxonomy of this genus was a compilation of external characters and genitalia of the same species from different localities, which are so variable that it is almost impossible to identify them correctly without special knowledge about this genus. Roth concluded that there were 23 species from Asia and the Pacific Islands and 26 species from Africa; however, *B. asahinai* Mizukubo, originally described from Japan, was completely neglected. Roth (1986) later confirmed that *B. beybienkoi* Roth was a junior synonym of *B. asahinai* Mizukubo.

Based on male characters (position and structure of tergal glands, shape of subgenital plate and styli, paraprocts, and genital phallomeres L3 and L2d), Roth (1985) arranged species of *Blattella* in 6 groups, namely, *germanica* species-group, *roederi* species-group, *biligata* species-group, *cavernicola* species-group, *humberiana* species-group, and *parenthesis* species-group. Roth (1991, 1997) transferred two species from *Phyllodromia* and *Theganopteryx* respectively into *Blattella*, and described two additional species from Myanmar and India (Roth, 1995). Currently, there are 53 species worldwide, among which eight species are known to be from China.

Herein, we redescribe *Blattella*, give a key to the Chinese species, and describe one new species from China. We also take the opportunity to confirm that *Blattella bisignata* (Brunner) is a cosmopolitan outdoor species and that *Blattella germanica* (Linnaeus) appears to be restricted co-habitation within human environments.

All type specimens studied were deposited in the Insect Collection of Southwest University (SWU), Beibei District, Chongqing, China.

2 TAXONOMY

Genus *Blattella* Caudell, 1903

Blattella Caudell, 1903, *Proc. Ent. Soc. Washington*, 5: 234.

Type species: *Blatta germanica* Linnaeus, 1767: 688.

Phyllodromia Serville, 1839, in *Hist. Nat. Ins., Ortho.*, 105.

Type species: *Blatta bivittata* Serville, 1839: 108.

Generic diagnosis [partly after Roth (1985)]

Vertex with interocular space slightly less than or about the same as the distance between antennal sockets. Pronotum sub-elliptical and flattened, concealing head and mesonotum, with anterior margin nearly truncate and middle of posterior margin slightly convex. Tegmina and hind wings usually fully developed reaching well beyond end of abdomen, hind wings shorter than tegmina, but sometimes reduced. Tegmen with longitudinal or sublongitudinal discoidal sectors. Hind wing with median and cubitus veins longitudinal; cubitus vein of hind wing straight or slightly curved, unbranched,

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or with 1 – 3 (usually 2) complete rami which reach the apical margin and usually without incomplete branches, cross veins present, costal veins not clubbed but may be slightly thickened distad, apical triangle present but small. Front femur Type A (anteroventral margin of front femur with spines which are smaller in size distad, terminating in 3 longer distal spines that increase in length ratio), posteroventral margins of mid and hind femurs with some spines; tarsal joints elongate, covered with small setae, pulvilli present on 4 proximal tarsomeres; tarsal claws symmetrical and unspecialized, usually simple, rarely minutely serrated on their inner margins. First abdominal

tergum of male always unspecialized. Abdominal tergum 7 (T7), or terga 7 and 8 specialized (tergal glands). Female abdominal terga unspecialized.

Male genitalia: Supra-anal plate asymmetrical, right and left paraprocts similar or asymmetrical, without spine-like processes. Male subgenital plate weakly or distinctly asymmetrical, styli variable. Genital hook on left side.

Remarks: In spite of its superficial resemblance to *Symptloce* Hebard, the abdominal tergum of male is always unspecialized, styli are small and unspecialized, and subgenital plate is always unspecialized in the genus *Blattella*.

Distribution: Worldwide.

Key to species of *Blattella* from China (male)

- 1 Subgenital plate with left side excavated and only with 1 style *Blattella singularis*, sp. nov.
Subgenital plate with left side excavated and with 2 styli 2
- 2 Styli markedly subequal, the left one small, knoblike, situated on or near the caudal corner of an angulate emargination of the left side of the subgenital plate, the right style much smaller. Abdominal tergum 7, or T7 and T8 modified 3
Right and left styli about equal, spinelike. Only abdominal tergum 7 modified 8
- 3 Abdominal tergum 8 with a medial longitudinal groove between the fossae, or with only a weak indication of a groove, or without a groove 4
Abdominal tergum 8 with a distinct medial, longitudinal, rounded mound, or with a narrow, longitudinal, medial carina 5
- 4 Medial longitudinal groove on T8 usually distinct, extending downwards between the fossae which, in chitin preparation, are more or less circular, or suboval *B. germanica*
Medial longitudinal groove on T8 absent, or weakly indicated; if present it does not extend between the fossae, rarely with a minutely raised, narrow, medial elevation. The fossae on T8 are subrectangular, extend laterally, and their posterior margins do not curve anteriorly *B. asahinai*
- 5 Fossae on T8 separated by a longitudinal, rounded mound which tapers strongly towards the hind margin of the segment; anteriorly on each side of the mound, is an additional rounded elevation. Fossae on T8 strongly curved anteriorly, their apexes reaching only to about the anterior margin of the segment *B. lituricollis*
Fossae on T8 separated by a uniformly narrow longitudinal ridge which extends the full length of the segment 6
- 6 Abdominal terga 7 and 8 modified, fossae on T8 extended laterally and do not reach the anterior margin of the segment *B. bisignata*
Only abdominal tergum 7 modified, fossae on T8 not as above 7
- 7 Tegmina reduced and hind wings much more reduced only reaching to about the third abdominal tergum *B. karnyi*
Tegmina and hind wings fully developed, over extending to the end of abdomen *B. formosana*
- 8 Posterior region of the fossae on the seventh abdominal tergum with bushy setal; both styli finger-like, approximately similar, apical round *B. sauteri*
Seventh abdominal tergum not as above; both styli spine-like, apical tapering *B. confusa*

2.1 *Blattella singularis* sp. nov. (Figs. 1 – 13)

Description: Pronotum length \times width: 2.1 – 2.2 mm \times 2.4 – 2.6 mm, tegmen 6.0 – 6.2 mm, body length including tegmen 7.8 – 8.1 mm.

Body reddish brown or dark brown with pale brown borders (Fig. 1). Vertex reddish brown with pale yellow band (Fig. 2). Occiput region pale yellow; antenna dark brown (Fig. 3). Pronotum yellowish brown with blackish brown maculae. Tegmina reddish brown, costal area pale brown. Hind wings pale brown, veins brown. Legs yellowish brown. Abdominal terga reddish brown with pale borders, venter reddish brown.

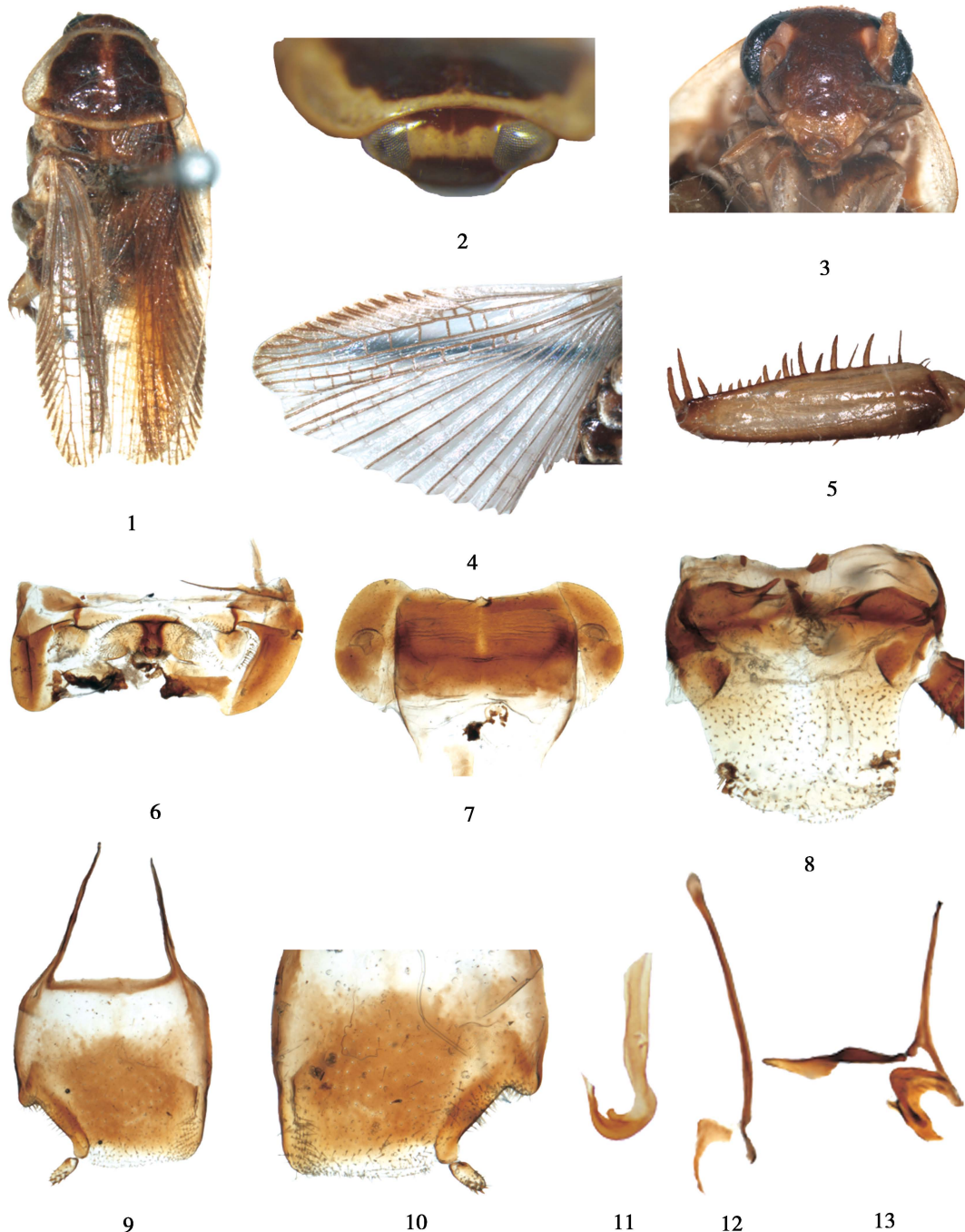
Vertex with interocular space slightly narrower than the distance between antennal sockets. Third and fifth maxillary palpomeres about the same length, both longer than the fourth. Pronotum nearly elliptical and middle of posterior margin slightly

convex (Fig. 1), disc with 2 broad maculae as in Fig. 1, but sometimes two maculae are merged together in female. Tegmina and hind wings fully developed extending well beyond the end of the abdomen. Hind wings with medial and cubital veins unbranched, triangular apical area small but distinct (Fig. 4). Front femur Type A₃ (Fig. 5), tarsal claws symmetrical and simple, without minute teeth on the ventral margins, pulvilli present on 4 proximal tarsomeres, pulvilli and arolia distinct. First and eighth abdominal terga unspecialized (Fig. 7); but seventh abdominal tergum specialized (Fig. 6), disc elevated with two hollows, margins armed with small spines.

Male genitalia: Supra-anal plate in ventral view nearly symmetrical, mediodistal region produced and scattered with some short setae, and hind margin rounded convex (Fig. 8). Paraprocts slightly

asymmetrical, right paraproct simple and slice-like, the above one with apex acuminate, the other with apex rounded, upturned and scattered with some setae; left paraproct irregular, the above one bilobate and with apices acuminate, the other apex rounded with some scattered setae (Fig. 8). Subgenital plate in dorsal view broad and asymmetrical (Fig. 9), with one style sitting beneath the incision (Figs. 9, 10); in dorsal view, left lateral angle inversed and inclined L-shaped

incision, right lateral angle rounded, left lateral margin strongly sinuate and the right convex (Fig. 9). Hook-like phallomere on the left and apex tapering (Fig. 11), inner margin smooth with a sheet-like structure, arising from the inner curved margin of the hook. Median phallomere slender, sticklike, stout at base and sharp-pointed apically (Fig. 12); right phallomere irregular sclerites as Fig. 13.



Figs. 1 – 13 *Blattella singularis* sp. nov.

1: Body; 2: Vertex; 3: Face; 4: Hind wing; 5: Front femur; 6: Seventh tergum; 7: Eighth tergum; 8: Supra-anal plate; 9: Subgenital plate (dorsal view); 10: Subgenital plate (ventral view, enlarged); 11: Left phallomere; 12: Median phallomere; 13: Right phallomere.

Female genitalia: Similar to male genitalia in morphology (in appearance), but middle of supra-anal plate with V-shaped incision; subgenital plate with hind margin rounded.

Holotype ♂: Zhangzhou, Fujian, ix. 1985, coll. YANG Lu-Bin. Paratypes 2 ♂ 1 ♀, same data as holotype.

Etymology: The specific name is derived from Latin, *singularis*, referring to subgenital plate with only one style.

Distribution: China (Fujian).

Remarks: In spite of this species only with one style, however, based on subgenital plate with L-shaped incision, as well as first abdominal tergum unspecialized, and seventh abdominal tergum specialized, we believe that it is a new species of *Blattella* and place it in the *germanica* species-group.

This species differs from all other species in this genus by its dark brown color and with one style on the end of subgenital plate.

2.2 *Blattella germanica* (Linnaeus, 1767)

Blatta germanica Linnaeus, 1767, in *Systema naturae* (II), 688.

Ischnoptera parallela Tepper, 1893, *Trans. Proc. Roy. Soc. South Australia*, 17: 53.

Phyllodromia magna Tepper, 1895, *Trans. Proc. Roy. Soc. South Australia*, 19: 19.

Blattella germanica (Linnaeus), Caudell, 1903, *Proc. Ent. Soc. Washington*, 5: 234.

Phyllodromia cunei-vittata Hanitsch, 1925, *Sarawak Mus.*, 3: 86.

Blattella stylifera Chopard, 1938, *Zool. Mem. Mus. Hist. Nat. Pairs.*, n. s., 8(4): 91.

Materials examined: 10 ♂ 2 ♀, Jilin, 23. iv. 1982, coll. CHEN Qing-En; 1 ♀, Anshan (indoor), v. 1979, collectors unknown; 3 ♂ 6 ♀, Urumqi, Xinjiang (indoor), iv. 1975, coll. MA Wen; 2 ♂, Beijing (indoor), 20. iii. 1980, coll. WU Fu-Zhen; 3 ♂ 2 ♀, Malianwa, Beijing (indoor), 29. v. 1964, collectors unknown; 2 ♂ 1 ♀, Yangling, Shaanxi (indoor), 16. xi. 2009, coll. WANG Zong-Qing.

Distribution: Worldwide.

Remarks: After examining a large number of specimens from several domestic institutions, including specimens from Institute of Zoology, Chinese Academy of Sciences; China Agricultural University; Northwest A & F University; Guizhou University; Institute of Plant Protection, Chinese Academy of Agricultural Sciences; Southwest University and other institutions (collected outdoors), we have not found *Blattella germanica*, so we infer that *Blattella germanica* (Linnaeus) appears to be restricted to buildings, vehicles and ships in China.

2.3 *Blattella asahinai* Mizakubo, 1981

Blattella asahinai Mizakubo, 1981, *Esakia*, 17: 153.

Blattella beybienkoi Roth, 1985, *Ent. Scand. Suppl.*, 22: 28.

Materials examined: 2 ♂ 1 ♀, Jinghong, Yunnan, 9/16. iv. 1981, coll. HE Jun-Hua; 1 ♂ 3 ♀, Ruili, Yunnan, 1. v. 1981, coll. HE Jun-Hua; 2 ♂ 2 ♀, Jinghong, Yunnan, 6. iv. 1986, coll. FENG Ping-Zhang; 4 ♂ 4 ♀, Simao, Yunnan, 4/6. vii. 2004, coll. WANG Zong-Qing; 7 ♂ 7 ♀, Simao, Yunnan, 4/6. vii. 2004, coll. XU Xiang-Rong; 2 ♀, Simao, Yunnan, 4/6. vii. 2004, coll. ZHANG Yan-Ning; 1 ♂ Mengla, Yunnan, 17. vii. 2004, WANG Zong-Qing; 1 ♂, Motuo, Tibet, 1 070 m, 14. v. 1980, coll. JIN Gen-Tao and WU Jian-Yi; 6 ♂, Motuo, Tibet, 850 m, 18/24. v. 1983, coll. HAN Yan-Heng; 2 ♀, Medog, Tibet, 1 000–1 200 m, 9. iv. 1983, coll. HAN Yan-Heng; 1 ♀, Motuo, Tibet, 850 m, 17. iii. 1983, coll. HAN Yan-Heng.

Distribution: China (Yunnan, Tibet); Japan, Indonesia, India, Malaysia, Myanmar, Thailand, England, United States.

2.4 *Blattella lituricollis* (Walker, 1868)

Blatta lituricollis Walker, 1868, in *Cat. Blatt. Brit. Mus.*, 105.

Phyllodromia lituricollis (Walker), Kirby, 1904, in *Syn. Cat. Orth.*, 90.

Blattella lituricollis (Walker), Karny, 1915, *Suppl. Ent.*, 4: 62.

Blatta colligata Walker, 1868, in *Cat. Blatt. Brit. Mus.*, 221.

Phyllodromia colligata (Walker), Kirby, 1904, in *Syn. Cat. Orth.*, 90.

Blattella zulu Princis, 1963, *S. Afric. Anim. Life*, 9: 203, fig. 119.

Materials examined: 1 ♂, Bawang Mountain, Hainan, 23. v. 1997, coll. WANG Lian-Min; 1 ♂, Huian, Fujian, 8. vi. 1975, coll. QI Shi-Cheng; 1 ♂, Huian, Fujian, 30. vii. 1975, coll. HUANG Bang-Kan; 1 ♂, Xiapu, Fujian, 14. viii. 1975, coll. HUANG Bang-Kan; 1 ♂, Pusha, Fujian, 14. viii. 1975, coll. HUANG Bang-Kan; 2 ♀, Xiapu, Fujian, viii. 1975, coll. HUANG Bang-Kan; 1 ♂, Nanning, Guangxi, 12. vi. 1974, collectors unknown; 31 ♂, 12 ♀, Menglun, Yunnan, 31. vii. 2009, Coll. Wang Zong-Qing.

Distribution: China (Fujian, Taiwan, Guangxi, Hainan, Yunnan); Philippines, Vietnam, Japan, Laos, Malaysia, Thailand, Indonesia, Myanmar, India, Sri Lanka, Cambodia, New Guinea, Papua Fiji, Kiribati, New Hebrides, New Caledonia, England, Hawaii, Solomon Islands, Micronesia Federated, Tonga, Seychelles, Mauritius, Madagascar, Kenya, South Africa, Comoro, Marshall Islands

2.5 *Blattella bisignata* (Brunner, 1893)

Phyllodromia bisignata Brunner, 1893, *Ann. Mus. Civ. Stor. Nat. Genova*, 33: 15.

Blattella lituricollis bisignata (Brunner), Princis, 1957, *Verh. Naturf. Ges. Basel*, 68: 142, fig. 10B, 11.

Blattella bisignata (Brunner), Princis, 1969, *Ortho. Cat.*, 13: 842.

Blattella lituricollis sundaica Princis, 1957, *Verh. Naturf. Ges. Basel*, 68: 143, fig. 10C, 12.

Materials examined: More than two hundred specimens were collected in more than ten provinces and cities from 1957 to 2009 in China.

Distribution: China (Yunnan, Gansu, Shaanxi, Shanxi, Jiangxi, Hainan, Guizhou, Hunan, Hubei, Chongqing, Sichuan, Guangxi, Guangdong, Fujian); Indonesia, Myanmar, Laos, Malaysia, Thailand, Singapore.

Remarks: A number of species in this group occur out-of-doors. The most common species in China is *Blattella bisignata*, which lives in leaf litter and grass or shrubs in forested areas.

In the past, many taxonomists concluded that *Blattella germanica* (Linnaeus) was the most widespread *Blattella* species in China. Many species of *Blattella* are so similar externally that it is almost impossible to identify them correctly without special knowledge of *Blattella*. A large number of other species have been wrongly regarded as the German cockroach. There are nine known species of *Blattella* distributed throughout China, but most of them look alike if one has not dissected the specimens to examine the details of the specialized abdominal terga and their styli of subgenital plate.

We now take the opportunity to correct the assumption that *Blattella germanica* (Linnaeus), which always appears in buildings or transportation vehicles, and is the cosmopolitan outdoor species. Instead, after checking hundreds of specimens from more than ten Chinese provinces, we believe that the correct outdoor species is *Blattella bisignata* (Brunner). Mainly, the two species can be distinguished by the characteristics described in Table 1.

Table 1 Comparison of *Blattella germanica* (Linnaeus) and *Blattella bisignata* (Brunner)

	<i>Blattella germanica</i> (Linnaeus, 1767)	<i>Blattella bisignata</i> (Brunner, 1893)
T8	With medial longitudinal groove on T8 usually distinct	With a narrow longitudinal ridge on T8
Fossae on T8	Fossae on T8 more or less circular, or suboval, their posterior margins curving anteriorly	Fossae on T8 more or less similar to sweep net
Left style	Left style with disperse small spines	Left style with a cluster small spines

2.6 *Blattella karnyi* Princis, 1969

Blattella humbertiana Karny, 1915, *Suppl. Ent.*, 4: 62.

Phyllodromia humbertiana (Karny), Shiraki, 1931, *Ins. Matsumurana*, 5(4): 204.

Blattella karnyi Princis, 1969, *Ortho. Cat.*, 13: 843.

No materials examined.

Distribution: China (Taiwan); Philippines.

2.7 *Blattella formosana* (Karny, 1915)

Theganopteryx formosana Karny, 1915, *Suppl. Ent.*, 4: 63.

Hemithyrsochera formosana (Karny), Princis, 1971, *Ortho. Cat.*, 14: 1127.

Blattella formosana (Karny), Roth, 1997, *Oriental Ins.*, 31: 231.

No materials examined.

Distribution: China (Taiwan).

2.8 *Blattella sauteri* (Karny, 1915)

Ischnoptera sauteri Karny, 1915, *Suppl. Ent.*, 4: 62.

Blattella sauteri (Karny), Princis, 1969, *Ortho. Cat.*, 13: 844

Blattella sauteri sauteri (Karny), Asahina, 1981, *Jap. J. Sanit. Zool.*, 32(4): 258.

Materials examined: 2 ♂, Menglun, Yunnan, 12. vii. 2004, coll. XU Xiang-Rong; 1 ♀ 1 ♂, Menglun, Yunnan, 12. vii. 2004, coll. WANG Zong-Qing; 1 ♂, Simao, Yunnan, 6. vii. 2004, coll. WANG Zong-Qing; 1 ♂ 2 ♀, Menglun, Yunnan, 12/13. vii. 2004, coll. ZHANG Yan-Ning; 1 ♀, Xishuangbanna, Yunnan, 650 m, 8. vi. 1958, coll. HONG Chun-Pei; 1 ♂, Xishuangbanna, Yunnan, 1 050 – 1 080 m, 7. vi. 1958, coll. WANG Shu-Yong; 1 ♂, Xishuangbanna, Yunnan, 650 m, 4. x. 1958, coll. CHEN Zhi-Zi; 1 ♂, Kangxian, Gansu, 27. vii. 2004, CHE Yan-Li (light trapping); 5 ♂ 2 ♀, Xiaoheijiang, Yunnan, 26. vii. 2009; 5 ♂ 2 ♀, Dadugang, Yunnan, 11/12. viii. 2009

Distribution: China (Gansu, Yunnan, Taiwan); Indonesia.

2.9 *Blattella confusa* Princis, 1950

Blattella confusa Princis, 1950, *Ark. Zool.*, 1: 215.

Blattella subcognata Princis, 1950, *Ark. Zool.*, 1: 216.

Materials examined: 2 ♀, Medong, Tibet, 850 – 930 m, 20/27. viii. 1974, coll. HUANG Fu-Sheng. 1 ♀, Zhikang, Tibet, 2 700 m, 3. vi. 1976, coll. HAN Yan-Heng; 5 ♂, Medong, Tibet, 940 – 1 250 m, 20. vii. 1979, coll. JIN Yin-Tao and WU Jian-Yi; 1 ♂ 1 ♀, Medong, Tibet, 1 600 m, 6. vi. 1982, coll. HAN Yan-Heng; 3 ♂, Medong, Tibet, 1 550 – 1 900 m, 24. v. 1983, coll. LIN Ran.

Distribution: China (Tibet); Myanmar, India, France.

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中国小蠊属分类研究及一新种记述 (蜚蠊亚目: 姬蠊科)

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摘要: 本文对小蠊属 *Blattella* Caudell 分类研究进行了回顾, 并记述分布于中国的小蠊属 9 种, 其中含一新种 *B. singularis* sp. nov., 对该种进行了描述并提供了形态特征图。编制了我国小蠊属种的检索表。

关键词: 蜚蠊; 小蠊属; 分类; 广布种; 新种; 中国

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